

AMENDMENTS TO THE CLAIMS:

The listing of claims will replace all prior versions, and listings of claims in the application:

LISTING OF THE CLAIMS

1. (Currently Amended) A vapor decontamination system for decontaminating a defined region, the system comprising:

at least a first duct through which a first carrier gas flow passes to the defined region;

5 an antimicrobial liquid source of a liquid which includes an antimicrobial compound;

a compressed gas source of a compressed, second carrier gas different from the first carrier gas;

10 a flash vaporizer for vaporizing a which receives the liquid which includes an antimicrobial compound into vapor; from the liquid source and the compressed second carrier gas from the compressed air source and creates a dispersion of the antimicrobial compound in the second carrier gas,

15 a second carrier gas flow connected with the flash vaporizer, an outlet of the flash vaporizer being connected to the duct for supplying the second carrier gas flow and vapor injecting the dispersion at a pressure higher than a pressure of the first carrier gas in the duct into the duct for absorption into the first carrier gas flow passing through the duct at a mixing zone downstream of the flash vaporizer; and

a means for introducing the liquid from a source to the flash vaporizer.

2. (Original) The system as set forth in claim 1 wherein the antimicrobial compound includes hydrogen peroxide and the flash vaporizer includes:

a metal block;

5 at least one heater for heating and maintaining the metal block at or above a vaporization temperature of hydrogen peroxide and below a hydrogen peroxide disassociation temperature; and

a passage extending through the block from an inlet to the outlet.

3. (Original) The system as set forth in claim 2 wherein the passage expands in cross section between the inlet and the outlet.

4. (Currently Amended) ~~The A vapor decontamination system as set forth in claim 3, wherein~~ for decontaminating a defined region, the system comprising:

at least a first duct through which a first carrier gas flow passes to the defined region;

a flash vaporizer for vaporizing a liquid which includes a hydrogen peroxide including antimicrobial compound into vapor, the flash vaporizer including:

a metal block;

at least one heater for heating and maintaining the metal block at or above a vaporization temperature of hydrogen peroxide and below a hydrogen peroxide disassociation temperature; and

a passage that expands in cross section between the inlet and the outlet, extending through the block from an inlet to the outlet, the passage turns turning at least 180° between the inlet and the outlet;

a second carrier gas flow connected with the flash vaporizer, an outlet of the flash vaporizer being connected to the duct for supplying a dispersion of the second carrier gas and vapor into the duct for absorption into the first carrier gas flow passing through the duct at a mixing zone downstream of the flash vaporizer; and,

a means for introducing the liquid from a source to the flash vaporizer.

5. (Original) The system as set forth in claim 4 wherein the passage includes at least two turns of approximately 90° and a wall therebetween, such that the liquid in the passage strikes the wall, thereby increasing a vaporization rate of the liquid antimicrobial compound.

6. (Original) The system as set forth in claim 4 wherein the passage includes:

a plurality of interconnected bores extending back and forth through the block between the inlet and the outlet.

7. (Previously Presented) The system as set forth in claim 12 further including:

a microbe trapping filter between the duct and the defined region.

8. (Previously Presented) The system as set forth in claim 1 further including:

a heater and a dehumidifier connected with the duct upstream from the mixing zone.

9. (Previously Presented) The system as set forth in claim 8 wherein the duct includes:

an inlet upstream of the heater and the dehumidifier connected with the defined region such that the first carrier gas flow is circulated from the duct inlet,
5 through the heater and dehumidifier, through the mixing zone, and through a duct outlet into the defined region.

10. (Original) The system as set forth in claim 9 further including:

microbe trapping filters disposed adjacent the duct inlet and the duct outlet.

11. (Previously Presented) The system as set forth in claim 9 wherein the antimicrobial compound includes hydrogen peroxide and further including:

a hydrogen peroxide destroyer for decomposing hydrogen peroxide
5 vapor into water vapor and oxygen, the destroyer being disposed upstream from the dehumidifier.

12. (Currently Amended) A decontamination system for decontaminating a defined region, the system comprising:

at least a first duct through which a first carrier gas flow is passed
from a first carrier gas service to the defined region;

5 a heated block ~~and that defines~~ fluid passage for dispersing a liquid which includes an antimicrobial compound in a second carrier gas flow, the heated block fluid passage having an inlet and an outlet, the outlet of the block fluid passage being connected to the duct for ~~supplying the second carrier gas flow with the dispersed liquid to~~ injecting a dispersion of the liquid in the second carrier gas into a
10 turbulent mixing zone in the duct at a higher pressure and a higher velocity than the first carrier gas flow to cause turbulent mixing and for absorption of the dispersion into the first carrier gas flow passing through the duct; and

 a source of the second carrier gas flow under pressure connected with the block inlet for creating a positive pressure differential from the heated block to the
15 mixing zone, the second carrier gas source being different from the first carrier gas source.

13. (Currently Amended) The system as set forth in claim 1 further including:

 at least one additional flash vaporizer and means for ~~introducing liquid connected with~~ injecting an additional quantity of the dispersion into the duct.

14. (Currently Amended) The system as set forth in claim 1 further including:

~~at least a second duct; and,~~

5 at least a second flash vaporizer which forms a dispersion of the antimicrobial liquid and the second carrier gas and ~~means for introducing liquid connected with~~ a second connecting duct connecting the second flash vaporizer to the second duct at a second mixing zone.

15. (Previously Presented) The system as set forth in claim 1 further including:

 a first plurality of monitors connected with the duct upstream of the mixing zone;

5 a second plurality of monitors disposed in the defined region; and

a controller connected to the monitors for controlling the means for introducing liquid in accordance with monitored conditions in the duct and in the defined region.

16. (Previously Presented) The system as set forth in claim 12 further including:

fans disposed in the defined region for circulating vapor into partially occluded subregions.

17. (Previously Presented) The system as set forth in claim 12 wherein the means for introducing the liquid further including a metering pump which meters the liquid into the passage of the block.

18. (Currently Amended) A method of decontaminating a defined region, the method comprising:

pumping a first carrier gas stream through a duct to the defined region;
in a passage different from the duct, converting a liquid into an antimicrobial dispersion in a second carrier gas stream; and

injecting the formed antimicrobial dispersion into the ~~second~~ first carrier gas stream at a lower flow rate and a higher velocity than the first carrier gas stream at a mixing zone defined in the duct upstream of the defined region to entrain the antimicrobial dispersion in the carrier gas.

19. (Currently Amended) The method as set forth in claim 18 wherein ~~[[a]]~~ the first carrier gas stream flows through the duct is at a rate of at least 20 cubic meters per minute and the defined region is an enclosure of at least 10,000 cubic meters.

20. (Previously Presented) The method as set forth in claim 18 wherein the antimicrobial dispersion includes vapor phase hydrogen peroxide and further including:

heating a block which has an internal passage to a temperature
5 sufficient to vaporize the hydrogen peroxide but which temperature is lower than a
temperature which disassociates hydrogen peroxide;

passing hydrogen peroxide into the passage through the block to
vaporize the hydrogen peroxide;

passing the hydrogen peroxide vapor from the passage into the mixing
10 zone; and

mixing the hydrogen peroxide vapor into the carrier gas flow.

21. (Currently Amended) A method of decontaminating a
defined region, the method comprising :

~~pumping~~ circulating a first carrier gas through a duct to the defined
region;

5 in a passage different from the duct, converting a liquid into an
antimicrobial dispersion which includes hydrogen peroxide in a second carrier gas
from a different source than the first carrier gas;

blowing ~~a second carrier gas through the passage with~~ the hydrogen
peroxide dispersion through the passage to create a positive pressure differential
10 between the passage and the duct; and

~~passing~~ injecting the antimicrobial dispersion from the passage into a
mixing zone defined in the duct upstream of the defined region to entrain the
antimicrobial dispersion in the first carrier gas.

22. (Original) The method as set forth in claim 20 further
including heating and drying the carrier gas in the duct upstream of the mixing zone.

23. (Currently Amended) The method as set forth in
claim ~~[[18]]~~ 21 further including:

pulling carrier gas with antimicrobial dispersion from the enclosed area
through a microbe-trapping filter; and

5 drying and heating the carrier gas and passing the dried, heated carrier
gas to the duct upstream of the mixing zone.

24. (Previously Presented) The method as set forth in claim 23 further including anti-microbially filtering carrier gas between the duct and the defined region.

25. (Original) The method as set forth in claim 18 wherein the defined region is a large room and the duct includes existing HVAC duct work.

26. (Previously Presented) The method as set forth in claim 25 further including:

supplying carrier gas through a plurality of ducts into the room; and
injecting hydrogen peroxide dispersion into the carrier gas in each of
5 the ducts.

27. (Previously Presented) The method as set forth in claim 18 further including:

directing antimicrobial dispersion in the defined region against at least one surface to be decontaminated.

28. (Previously Presented) The method as set forth in claim 18 further including:

monitoring concentration of the antimicrobial compound in the dispersion in the room and carrier gas conditions in the duct upstream of the mixing
5 zone, and

controlling a rate at which the antimicrobial dispersion is supplied to the duct in accordance therewith.

29. (Previously Presented) The method as set forth in claim 18 further including:

monitoring a concentration of the antimicrobial compound in the dispersion in the defined region until the concentration reaches a preselected level;
5 and

holding the dispersion in the defined region without further addition of antimicrobial dispersion for a period of time.

30. (Previously Presented) The method as set forth in claim 18 further including:

heating a block above a vaporization temperature of a peroxy compound; and

5 metering the peroxy compound in liquid form into an internal bore in the block to vaporize the peroxy compound.

31. (Previously Presented) The method as set forth in claim 18 further including:

entraining a liquid peroxy compound into a controlled air flow in the passage.

32. (Previously Presented) The method as set forth in claim 31 wherein the passage turns and further including:

propelling peroxy compound droplets into heated passage surfaces at turns in the passage.

33. (Currently Amended) A method of decontaminating an enclosure comprising:

compressing a second carrier gas into a reservoir;

5 providing a first carrier gas stream and a ~~second carrier gas~~ stream of the second carrier gas from the reservoir, the ~~first~~ second carrier gas stream having a lower flow rate than the ~~second~~ first carrier gas stream;

introducing the ~~first~~ second stream to a passage, the passage having at least one bend;

10 introducing a flow of an aqueous solution of a peroxy compound into the passage upstream of the bend, the peroxy compound mixing with the ~~first~~ second stream, walls of the passage being heated to vaporize the aqueous solution forming a dispersion of the aqueous solution in the second carrier gas; and

- 15 ~~mixing the vaporized aqueous solution and injecting the dispersion into~~
~~the first carrier gas stream with the second carrier gas stream~~ with a sufficiently high
velocity to cause turbulent mixing of the dispersion into the first carrier gas stream in
a mixing zone ~~downstream of the passage~~ and transporting the mixed ~~vaporized~~
~~aqueous solution and dispersion and~~ first and ~~second~~ carrier gas stream[[s]] to the
enclosure.